

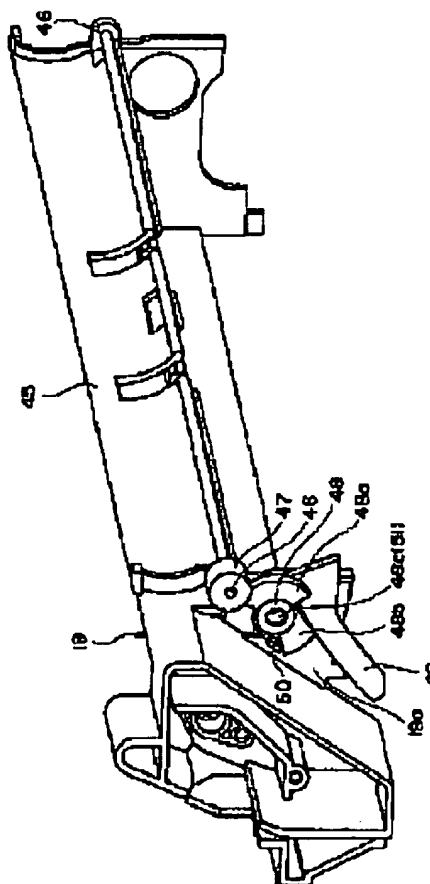
IMAGE FORMING DEVICE

Patent number: JP2000259061
Publication date: 2000-09-22
Inventor: AMAMIYA MASARU; MIZUISHI HARUJI; MIZUSAWA HIROSHI; OHORI MAYUMI; TANAKA MASARU; TATSUMI KENZO; USUI NORIYUKI; YAMAGUCHI TOSHITAKA; YOSHINAMI HIDEKI
Applicant: RICOH KK
Classification:
- international: **G03G21/18; G03G21/18;** (IPC1-7): G03G21/18
- european:
Application number: JP19990062844 19990310
Priority number(s): JP19990062844 19990310

Report a data error here

Abstract of JP2000259061

PROBLEM TO BE SOLVED: To obtain a small sized image forming device with a comparatively small number of parts, that is simple and inexpensive by carrying out opening and closing of a shutter for an opening for transferring a process cartridge with a lever of a device main body, a relay member of the process cartridge and a drive gear of the shutter part. **SOLUTION:** In this image forming device, a lever 49 is also moved with a rotational support point as the center when a right side cover for the main body is moved to a closing direction from an opened state and a tip of the lever is engaged with the cam 48b of the relay member 48. Furthermore, rotation of the relay member 48 is started by having the cam 48b pushed by the lever 49 when the movement is further advanced. The rotation of the shutter 45 in the direction to have the opening part opened is started with the supporting point 46 as the center with engagement of the driving gear 47 when rotation of an idler gear 48a is also started along with the above movement. Then, when the right side cover of the main body is completely closed, the opening part is completely released by the shutter 45. On the other hand, when the right side cover for the main body is moved in the direction to be opened, the engagement of the lever 49 and the cam 48b is released and the opening part is covered by the shutter 45 by weight of the shutter 45, etc.



Data supplied from the esp@cenet database - Worldwide

Family list

2 family member for:

JP2000259061

Derived from 1 application.

[Back to JP2000259061](#)

1 IMAGE FORMING DEVICE

Publication info: **JP3654788B2 B2** - 2005-06-02

JP2000259061 A - 2000-09-22

Data supplied from the **esp@cenet** database - Worldwide

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] It has a process means to act on image support and this image support, in a cartridge case. Opening for imprinting the toner image formed in said image support to a transfer paper is formed in this cartridge case. In the image formation equipment which is equipped with the process cartridge which has further the shutter which can be opened and closed to this opening, opens and closes body covering of the body of equipment, and inserts [process cartridge / this] The drive gear which is equipped with the lever which interlocks and moves to closing motion of said body covering, and is rotated in one with said shutter to said process cartridge, Where it had the junction member which the cam which engages with the idler gear which engages with this drive gear, and said lever unified and said body of equipment is equipped with said process cartridge Image formation equipment characterized by opening and closing said shutter by migration of said lever interlocked with closing motion of said body covering.

[Claim 2] Image formation equipment according to claim 1 characterized by forming the idler gear and cam of said junction member in the shaft orientations of said junction member in the shape of a stage.

[Claim 3] Image formation equipment given in claims 1 or 2 characterized by forming so that the engagement section of said idler gear and drive gear may be arranged on the outside of said body side plate when the both ends of the direction which is in agreement with the longitudinal direction of said process cartridge are equipped with a body side plate, respectively and said body of equipment is equipped with said process cartridge.

[Claim 4] Image formation equipment given in any 1 term of claims 1-3 characterized by forming so that rotation of said shutter may resist gravity and may begin, when disconnection of said body covering is interlocked with and said lever and cam stop engaging.

[Claim 5] Image formation equipment given in any 1 term of claims 1-4 characterized by preparing the projection which regulates the rotation range of said junction member to said cartridge case.

[Claim 6] Image formation equipment given in any 1 term of claims 1-5 characterized by having equipped said cartridge case with the support shaft which fits into the revolving-shaft hole of said junction member, and making said revolving-shaft hole and support shaft into the configuration which has the level difference of a tip minor diameter, respectively.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the image formation equipment using electrophotography methods, such as a copying machine, a printer, facsimile, or those compound machines, about image formation equipment.

[0002]

[Description of the Prior Art] Conventionally, with image formation equipments, such as a copying machine and a printer, the process cartridge which contained a photo conductor (image support) and process means, such as a developer and electrification equipment, in the cartridge case is used. This process cartridge can attain the miniaturization of the whole equipment while it is formed possible [insertion and detachment] to the body of image formation equipment and can aim at improvement in serviceability or maintenance nature.

[0003] Furthermore, generally the process cartridge has prepared opening in the part equivalent to the imprint section of the photo conductor in a cartridge case, and is imprinting the toner image on a photo conductor from the part to the transfer paper. However, if it remains as it is, since some photo conductors are exposed from the opening, the part may deteriorate by outdoor daylight, or the process cartridge removed from the body of image formation equipment may be damaged according to a certain external force.

[0004] In order to prevent such fault, many image formation equipments which formed the shutter which can be freely opened and closed to opening equivalent to the imprint section of a photo conductor are developed. Namely, with such image formation equipment, when equipping the body of equipment with a process cartridge and actually carrying out image formation, such as a copy, will be opened by the shutter. When a process cartridge is picked out from the body of equipment to it, it is changing into the condition that the shutter closed.

[0005] As image formation equipment which has such a shutter breaker style, the following is indicated, for example in JP,7-120136,B. This image formation equipment is equipped with the rod for making body covering opened and closed at the time of insertion and detachment of a process cartridge open and close a shutter etc. And closing motion of the body covering is interlocked with, and it has composition which a shutter rotates.

[0006] The shutter specifically energized in the direction always closed with a spring to a process cartridge is formed. The shank is prepared in the edge of this shutter. On the other hand, the shutter lever with a pinion which engages with the rod which is interlocked with closing motion of body covering and moves to the body of equipment, the rack interlocked with migration of the rod, and its rack, and is rotated is prepared.

[0007] This shutter lever engages with the shank of the shutter of the process cartridge with which the body of equipment was equipped. And a rod and a rack will move in the slide direction, it will be interlocked with further, and a shutter lever will open [where the body of equipment is equipped with a process cartridge / if body covering is opened and closed] and close the shutter of a process cartridge.

[0008]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional image formation equipment, components mark became [many devices concerning closing motion of the shutter of a process cartridge] complicated, and it had become the evil of the miniaturization of the body of equipment, or low-pricing.

[0009] For example, in the case of the image formation equipment of the above-mentioned official report, in order that a rod and a rack might move in the slide direction, it was difficult [it] for the migration length to become long, to secure the tooth space, and to miniaturize the body of equipment. Therefore, this invention makes it a technical problem to offer image formation equipment [that it is small and low price / as a simple thing] for the breaker style of the shutter formed in opening for an imprint of a process cartridge.

[0010]

[Means for Solving the Problem] When the sign which it was made in order that this invention might solve this technical problem, namely, was given to the accompanying drawing is written in addition in a parenthesis, this invention It has a process means (11, 12, 15) to act on image support (10) and image support (10) in a cartridge case (19). Opening for imprinting the toner image formed in image support (10) to a transfer paper (P) is formed in a cartridge case (19). In the image formation equipment which is equipped with the process cartridge (20) which has further the shutter (45) which can be opened and closed to opening, opens and closes body covering (23) of the body of equipment (1), and inserts [process cartridge / (20)] The drive gear which is equipped with the lever (49) which interlocks and moves to closing motion of body covering (3), and is rotated in one with a shutter (45) to a process cartridge (20) (47), Where it had the junction member (48) which the cam (48b) which engages with the idler gear (48a) which engages with a drive gear (47), and a lever (49) unified and the body of equipment (1) is equipped with a process cartridge (20) It is image formation equipment characterized by opening and closing a shutter (45) by migration of the lever (49) interlocked with closing motion of body covering (3).

[0011] It is desirable in that case to form the idler gear (48a) and cam (48b) of a junction member (48) in the shaft orientations of a junction member (48) in the shape of a stage.

[0012] Furthermore, when the both ends of the direction which is in agreement with the longitudinal direction of a process cartridge (20) are equipped with a body side plate, respectively and the body of equipment (1) is equipped with a process cartridge (20), it is desirable to form so that the engagement section of an idler gear (48a) and a drive gear (47) may be arranged on the outside of a body side plate (4).

[0013] Moreover, when disconnection of body covering (3) is interlocked with and a lever (49) and a cam (48b) stop engaging, it is desirable to form so that rotation of a shutter (45) may resist gravity and may begin.

[0014] Moreover, it is desirable to prepare the projection (50) which regulates the rotation range of a junction member (48) to a cartridge case (19).

[0015] Moreover, it is desirable to equip a cartridge case (19) with the support shaft (51) which fits into the revolving-shaft hole (48c) of a junction member (48), and to make a revolving-shaft hole (48c) and a support shaft (51) into the configuration which has the level difference of a tip minor diameter, respectively.

[0016]

[Embodiment of the Invention] A drawing explains the gestalt of implementation of this invention. Drawing 1 - 13 show the image formation equipment by this invention. Drawing 1 is the schematic diagram showing the configuration of the important section of the laser copying machine as image formation equipment. A developer 12, imprint equipment 13, delevaing equipment 14, cleaning equipment 15, etc. are arranged in order in the hand of cut shown by the arrow head A in drawing from the electrification equipment 11 of the shape of a roller arranged horizontally [the] around the photo conductor 10 of the shape of a drum as image support.

[0017] When taking a copy with this laser copying machine, a copy switch is pushed after a user sets a manuscript on a contact lens (un-illustrating) a well-known passage. A transfer paper P is conveyed by the form conveyance section (un-illustrating) towards between a photo conductor 10 and imprint equipment 13 at the same time the image information of the manuscript set with the optical reader (un-illustrating) will be read, if a copy switch is pushed (it is the direction of an arrow head of drawing 1).

[0018] On the other hand, in a photo conductor 10, with the rotation, a front face is uniformly charged with electrification equipment 11, and laser beam L emitted by the front face from equipment (un-illustrating) write-in [optical] corresponding to the image information of the manuscript mentioned above is irradiated. Of this, the electrostatic latent image corresponding to the image of a manuscript is formed on a photo conductor 10.

[0019] Furthermore, with rotation of a photo conductor 10, the electrostatic latent image formed on the photo conductor 10 arrives at the location of a developer 12, and is formed into a visible image by adhering to a toner there. And the toner image as this copy image formed into the visible image is imprinted on the transfer paper P which arrived at the location of imprint equipment 13 further, and was conveyed in that location as mentioned above.

[0020] The transfer paper P after the copy image was imprinted discharges with delevaing equipment 14, and is separated from the photo conductor 10 to which it was sticking electrostatic. And a transfer paper P is discharged by the discharge section (un-illustrating), after being conveyed in the location of an anchorage device (un-illustrating) and being fixed to the transfer picture on a transfer paper P there.

[0021] On the other hand, in the photo conductor 10 after imprinting a toner image with imprint equipment 13,

after the residual toner which remained without the front face imprinting is dropped [it scratched it and] and cleaned by the cleaning blade 17 with which cleaning equipment 15 was equipped, electricity is discharged with an electric discharge lamp (un-illustrating), and surface potential is initialized.

[0022] Moreover, in the illustration laser copying machine, the developer 12 is constituted by the developer stowage 21 established in the lower part side, and the developer support section 22 prepared in the upper part side, as shown in drawing 1 . Furthermore, the developer stowage 21 mainly consists of a 1st churning member 23, a 2nd churning member 24, a toner concentration sensor (un-illustrating), etc.

[0023] And 2 component developer which consists of the toners and carriers in the developer stowage 21 is agitated by the 1st churning member 23 and the 2nd churning member 24, and is supplied to the developer support section 22. Moreover, the toner of 2 component developer and the mixing ratio of a carrier are magnetically detected by the toner concentration sensor.

[0024] Furthermore, as shown in drawing 2 , the opening 25 of the new toner and the opening 26 of the recycle toner open, and are established upward in the developer stowage 21 at one side of a longitudinal direction, respectively. And by the 1st churning member 23 and the 2nd churning member 24, the toner containing from those openings 25 and 26 is conveyed so that it may circulate in the direction of an arrow head in drawing.

[0025] Here, the new toner supplied from the opening 25 of the new toner is supplied from the toner supply section (un-illustrating) which consists of a toner bottle, a toner hopper, a toner supply motor, etc. Moreover, the recycle toner supplied, i.e., the residual toner collected with cleaning equipment 15, is supplied through a toner conveyance member etc. from the opening 26 of the recycle toner.

[0026] As shown in drawing 3 , specifically, the toner conveyance member 30 prepared in the cleaning equipment 15 which it has on a photo conductor 10 at the shaft orientations of a photo conductor 10 consists of a shank 31, the screw section 32, etc.

[0027] And the residual toner conveyed by end section 31a of a shank 31 by the toner conveyance member 30 falls from the fall way inlet port 33 established in the dark room section 19a bottom of a cartridge case 19, as shown in drawing 4 . Then, a residual toner slides down the fall way 35 and goes into the fall way outlet 37. The residual toner which fell from the fall way outlet 37 falls to the opening 26 of the recycle toner of the developer 12 mentioned above.

[0028] On the other hand, as shown in drawing 1 , the developer support section 22 mainly consists of a developing roller 28, a development doctor 29, etc. The developing roller 28 is arranged through the development aperture 27 in the photo conductor 10 and the location which counters. Moreover, the development doctor 29 prepares a developing roller 28 and few clearances, is arranged, and is controlling the amount of the developer conveyed in the location of a photo conductor 10 by this clearance.

[0029] Here, in an illustration laser copying machine, as shown in drawing 4 , the photo conductor 10 mentioned above, electrification equipment 11, a developer 12, cleaning equipment 15, etc. are contained in the cartridge case 19, and form the unified process cartridge 20.

[0030] And as shown in drawing 5 , the process cartridge 20 is attached between the body side plates countered and arranged forward and backward within the body 1 of equipment of a laser copying machine, and it can further insert [process cartridge] in the direction of an arrow head in drawing. By this, a process cartridge 20 will be exchanged for the new process cartridge 20 by the user, or will be maintained.

[0031] A series of activities concerning insertion and detachment of a process cartridge 20 are explained in detail below. As shown in drawing 5 , when removing a process cartridge 20 from the body 1 of equipment, the right covering 3 of a body is first opened in the direction of an arrow head in drawing. Here, the right covering 3 of a body is equipped with the imprint equipment 13 and the deleaving equipment 14 which are not illustrated, closing motion of the right covering 3 of a body is interlocked with, and they are attached to the process cartridge 20 within the body 1 of equipment, or are removed.

[0032] Next, the body frame front cover 2 is opened in the direction of an arrow head in drawing following the right covering 3 of a body of the body 1 of equipment. Then, a process cartridge 20 will be pulled out in the direction of an arrow head in drawing. On the other hand, when equipping the body 1 of equipment with a process cartridge 20, an activity contrary to this will be done.

[0033] In addition, closing motion of the body frame front cover 2 or the right covering 3 of a body is performed timely, when poor conveyance (jam) of a transfer paper else [at the time of insertion and detachment of a process cartridge 20] occurs. Moreover, even if the above-mentioned sequence of closing motion of the body frame front cover 2 and the right covering 3 of a body is reverse, insertion and detachment of a process

cartridge 20 are possible.

[0034] And opening is prepared in the part (it is the part which counters imprint equipment 13 and delevaing equipment 14.) equivalent to the imprint section of a cartridge case 19, and as mentioned above, as shown in drawing 4 , the shutter 45 which can be opened and closed is further formed in the process cartridge 20 to the opening.

[0035] This shutter 45 is for protecting the photo conductor 10 exposed from opening, when a process cartridge 20 is removed from the body 1 of equipment, as mentioned above. That is, at least, at the time of a copy, the shutter 45 is moving to the location which opens opening, and when removed from the body 1 of equipment, a shutter 45 moves opening to a wrap location.

[0036] So, in addition, it consists of image formation equipment concerning this invention as follows that the breaker style of this shutter 45 should be made a simple thing. Drawing 6 and 7 are the perspective views showing the important section of a cartridge case 19. A shutter 45 is supported in the supporting-point section 46 of the both ends of a cartridge case 19, and is rotatable focusing on the supporting-point section 46. That is, drawing 6 shows the condition that the shutter 45 of a process cartridge 20 closed, and drawing 7 is the perspective view showing the condition that the shutter 45 opened.

[0037] And it is formed in the single-sided edge (it is the dark room section 19a side.) of a shutter 45 so that the drive gear 47 may rotate in one with a shutter 45. Here, the drive gear 47 may be formed in a shutter 45 and one by shaping, and may be formed in one of a screw, adhesion, etc.

[0038] Furthermore, wrap gear covering (un-illustrating) etc. is installed in the same side as this drive gear 47 in the junction member 48, the drive gear 47, and the junction member 48 equipped with idler gear 48a which engages with the drive gear 47.

[0039] The junction member 48 had revolving-shaft hole 48c in the interior, and has fitted into the support shaft 51 projected from dark room section 19a of a cartridge case 19. This junction member 48 is rotated centering on this support shaft 51. Moreover, idler gear 48a which engages with the drive gear 47 mentioned above in the junction member 48, and cam 48b which engages with the lever 49 mentioned later are prepared in shaft orientations in the shape of a stage. In this way, rotation of the junction member 48 is interlocked with and closing motion of a shutter 45 is carried out.

[0040] Next, closing motion of the shutter 45 of the process cartridge 20 interlocked with closing motion of the right covering 3 of a body of the body 1 of equipment in drawing 8 - drawing 13 is explained in detail. The junction member 48 in the body 1 of equipment etc. is interlocked with closing motion of the right covering 3 of a body in the edge by the side of dark room section 19a arranged, and it is formed in the right covering 3 of a body, and one as cam 48b of the junction member 48 and the movable lever 49 from which it engages and secedes show drawing 5 .

[0041] Here, as shown in drawing 13 , focusing on the rotation supporting point C of the right covering 3 of a body, a lever 49 draws the radii configuration of a radius r, and moves. In addition, this lever 49 may be separately formed in the right covering 3 of a body.

[0042] If the right covering 3 of a body specifically moves in the direction closed from an open condition, as shown in drawing 8 , the lever 49 will also move focusing on the rotation supporting point C, and the tip of a lever 49 will engage with cam 48b of the junction member 48 soon. Furthermore, if migration of the right covering 3 of a body progresses, migration of a lever 49 also progresses, cam 48b will be pushed on a lever 49, and the junction member 48 will begin rotation. In connection with this, idler gear 48a also begins rotation, and a shutter 45 begins rotation focusing on the supporting-point section 46 by engagement of idler gear 48a and the drive gear 47 in the direction which opens opening.

[0043] And when the right covering 3 of a body is shut completely, as shown in drawing 9 , a shutter 45 opens opening completely. If the right covering 3 of a body moves in the direction opened from an electric shielding condition contrary to this, engagement of a lever 49 and cam 48b will be solved, and a shutter 45 will cover opening with gravity, such as a shutter 45.

[0044] As mentioned above, the mark of the component part concerning the breaker style of a shutter 45 can be lessened as compared with the conventional breaker style, and simple image formation equipment can be offered.

[0045] Next, the motion is explained while drawing 11 and 12 explain the configuration of the junction member 48. As shown in drawing 11 , the junction member 48 mainly consists of idler gear 48a, cam 48b, revolving-shaft hole 48c, etc. And idler gear 48a and cam 48b are formed in the shape of a stage to the shaft orientations

of the junction member 48, as shown in this drawing.

[0046] On the other hand, the lever 49 mentioned above is arranged to the body of equipment 1 interior corresponding to the location of this cam 48b. Thus, since it becomes the physical relationship from which the successive range of a lever 49 and the successive range of idler gear 48a always shifted to shaft orientations by having prepared idler gear 48a and cam 48b in the shape of a stage, there is no constraint on a special design and it can prevent that a lever 49 and idler gear 48a interfere mutually. Thereby, the junction member 48 can be made comparatively small.

[0047] Moreover, at least, when the body 1 of equipment is equipped with a process cartridge 20, as shown in drawing 12, the engagement section of idler gear 48a and the drive gear 47 is formed so that it may be arranged on the outside of the body propleuron 4 shown in drawing 5 of the body 1 of equipment. By taking such a configuration, distance between the body side plates before and behind the body 1 of equipment can be made comparatively narrow.

[0048] That is, as mentioned above, since a process cartridge 20 is attached between the body side plates before and behind the body 1 of equipment, the distance between body side plates becomes larger than the distance between Itabe of the both ends of a cartridge case 19. And in order to store the right covering 3 of a body equipped with imprint equipment 13 etc. in the range of the width of face between body side plates, cam 48b related right covering of body 3 configuration and directly is arranged inside idler gear 48a which is not related right covering of body 3 configuration, and directly. And about idler gear 48a without the need of storing between body side plates, it arranges on the outside, and is made to engage with the drive gear 47.

[0049] Next, drawing 9 and 10 explain the gestalt of other operations. If the right covering 3 of a body is wide opened in order to remove a process cartridge 20 from the body 1 of equipment as mentioned above, a lever 49 will move in the direction (it is the direction of an arrow head in drawing.) which separates from cam 48b from the condition of drawing 9. Here, the weight of cam 48b of the junction member 48 is set up comparatively greatly, and the shutter 45 is further set as bigger weight than the weight of cam 48b.

[0050] And if a lever 49 is canceled of cam 48b, it will move without auxiliary energization force, such as a spring, by the equilibrium of the moment of force of the gravity direction in the supporting-point section 46 of a related member until a shutter 45 closes this shutter breaker style completely.

[0051] Just before a lever 49 separates from cam 48b, specifically, rotation of the junction member 48 and a shutter 45 is inhibited [*****] by the lever 49. And immediately after a lever 49 separates from cam 48b, the junction member 48 and a shutter 45 begin to rotate with a shutter 45 or the weight of cam 48b. Namely, since it is designed so that the center of gravity of a shutter 45 may become the location slightly shifted in the direction closed from the line top of the perpendicularly the supporting-point section 46 is contained, or there at the time, the moment is committed in the direction which closes zero or a shutter 45 mostly.

[0052] Then, the center of gravity of a shutter 45 shifts greatly from on the vertical line containing the supporting-point section 46, the moment by the weight is added, and as shown in drawing 10, rotation of the junction member 48 and a shutter 45 progresses. Further after that, it rotates further in the direction which closes opening, and, finally a shutter 45 moves a shutter 45 to the condition closed completely.

[0053] Thus, a certain and simple shutter breaker style can be offered, without preparing special energization members, such as a spring, in a shutter 45.

[0054] Next, drawing 8 and 9 explain the gestalt of other operations. In the cartridge case 19 of a process cartridge 20, the projection 50 (rib) which regulates the rotation range of the junction member 48 is formed in the dark room section 19a side in which the junction member 48 is formed.

[0055] As shown in drawing 8, when a shutter 45 specifically closes, idler gear 48a of the junction member 48 contacts projection 50, and rotation of a shutter 45 progresses from a predetermined electric shielding location. By this, a shutter 45 rotates too much and the fault which damages a photo conductor 10 can be prevented.

[0056] Moreover, as shown in drawing 9, when a shutter 45 opens, cam 48b of the junction member 48 contacts projection 50, and rotation of a shutter 45 progresses from a predetermined open position. By this, as mentioned above, gravity can be resisted and rotation of a shutter 45 can be started certainly.

[0057] Here, if it attaches so that idler gear 48a and the projection 50 which mentioned above may contact, where a shutter 45 is closed completely in case the junction member 48 is attached to a cartridge case 19, a shutter 45 will be opened and closed in the always normal rotation range.

[0058] Next, drawing 11 and 12 explain the gestalt of other operations. The support shaft 51 of dark room section 19a which supports the junction member 48 serves as an axial configuration with the level difference of

the tip minor diameter which has different shaft diameters d1 and d2, as shown in drawing 11 . And revolving-shaft hole 48c of the junction member 48 which fits into this support shaft 51 is also a hole configuration with the level difference of the tip minor diameter which has the slightly larger diameters D1 and D2 of an axial hole than shaft diameters d1 and d2, as shown in the sectional view of the shaft orientations of the junction member 48 of drawing 12 .

[0059] By this, the junction member 48 will always be set in the direction of normal, without setting conversely the direction of idler gear 48a and cam 48b to the support shaft 51. Moreover, positioning of the shaft orientations of the junction member 48 can be performed with the level difference configuration of this tip minor diameter. The attachment nature of a process cartridge 20 can be improved by such configuration.

[0060] In addition, in the example of illustration, although shutter breaker styles, such as the junction member 48 and a lever 49, were prepared in the body propleuron 4 side, this invention may be prepared in the opposite backside [a body], without being limited to this.

[0061] Moreover, in the example of illustration, although the insertion-and-detachment direction of a process cartridge 20 was made into the longitudinal direction of a photo conductor 10, even if it inserts in the direction which intersects perpendicularly with it, this invention is applicable. For example, the right covering 3 of a body of drawing 5 is opened and closed, and this invention is applicable even if it is image formation equipment of a configuration of inserting [process cartridge / 20] from there.

[0062] Moreover, in the example of illustration, although the laser copying machine was described as image formation equipment, naturally this invention is applicable to other image formation equipments, for example, an analog copying machine, facsimile, a laser beam printer, etc.

[0063]

[Effect of the Invention] According to invention concerning claim 1, since the shutter of opening for an imprint of a process cartridge is opened and closed by the lever of the body of equipment, the junction member, and the drive gear of the shutter section of a process cartridge, there are comparatively few components mark, it is simple and cheap, and small image formation equipment can be offered.

[0064] According to invention concerning claim 2, since the idler gear and the cam are formed in the shape of a stage in a junction member, interference with a lever and an idler gear can be prevented without the constraint on a design, and image formation equipment with a comparatively small junction member can be offered.

[0065] According to invention concerning claim 3, since the engagement section of an idler gear and the drive gear of a shutter is arranged out of a body side plate, distance between body side plates can be made comparatively small, and small image formation equipment can be offered.

[0066] Since according to invention concerning claim 4 special energization members, such as a spring, are not prepared in order to close a shutter, the image formation equipment which has a simple and cheap shutter breaker style can be offered.

[0067] Since according to invention concerning claim 5 the projection was prepared in the side face of a process cartridge and the rotation range of a junction member is regulated, damage on image support is prevented and the image formation equipment which can open and close a positive shutter can be offered.

[0068] Since according to invention concerning claim 6 the level difference of a tip minor diameter is prepared in the fitting section of the revolving-shaft hole of a junction member, and the support shaft of a cartridge case, and it prevents that a junction member is attached conversely and positioning of the shaft orientations of a junction member is made easy, the good image formation equipment of attachment nature can be offered.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] Especially this invention relates to the image formation equipment using electrophotography methods, such as a copying machine, a printer, facsimile, or those compound machines, about image formation equipment.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] Conventionally, with image formation equipments, such as a copying machine and a printer, the process cartridge which contained a photo conductor (image support) and process means, such as a developer and electrification equipment, in the cartridge case is used. This process cartridge can attain the miniaturization of the whole equipment while it is formed possible [insertion and detachment] to the body of image formation equipment and can aim at improvement in serviceability or maintenance nature.

[0003] Furthermore, generally the process cartridge has prepared opening in the part equivalent to the imprint section of the photo conductor in a cartridge case, and is imprinting the toner image on a photo conductor from the part to the transfer paper. However, if it remains as it is, since some photo conductors are exposed from the opening, the part may deteriorate by outdoor daylight, or the process cartridge removed from the body of image formation equipment may be damaged according to a certain external force.

[0004] In order to prevent such fault, many image formation equipments which formed the shutter which can be freely opened and closed to opening equivalent to the imprint section of a photo conductor are developed.

Namely, with such image formation equipment, when equipping the body of equipment with a process cartridge and actually carrying out image formation, such as a copy, will be opened by the shutter. When a process cartridge is picked out from the body of equipment to it, it is changing into the condition that the shutter closed.

[0005] As image formation equipment which has such a shutter breaker style, the following is indicated, for example in JP,7-120136,B. This image formation equipment is equipped with the rod for making body covering opened and closed at the time of insertion and detachment of a process cartridge open and close a shutter etc. And closing motion of the body covering is interlocked with, and it has composition which a shutter rotates.

[0006] The shutter specifically energized in the direction always closed with a spring to a process cartridge is formed. The shank is prepared in the edge of this shutter. On the other hand, the shutter lever with a pinion which engages with the rod which is interlocked with closing motion of body covering and moves to the body of equipment, the rack interlocked with migration of the rod, and its rack, and is rotated is prepared.

[0007] This shutter lever engages with the shank of the shutter of the process cartridge with which the body of equipment was equipped. And a rod and a rack will move in the slide direction, it will be interlocked with further, and a shutter lever will open [where the body of equipment is equipped with a process cartridge / if body covering is opened and closed] and close the shutter of a process cartridge.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] According to invention concerning claim 1, since the shutter of opening for an imprint of a process cartridge is opened and closed by the lever of the body of equipment, the junction member, and the drive gear of the shutter section of a process cartridge, there are comparatively few components mark, it is simple and cheap, and small image formation equipment can be offered.

[0064] According to invention concerning claim 2, since the idler gear and the cam are formed in the shape of a stage in a junction member, interference with a lever and an idler gear can be prevented without the constraint on a design, and image formation equipment with a comparatively small junction member can be offered.

[0065] According to invention concerning claim 3, since the engagement section of an idler gear and the drive gear of a shutter is arranged out of a body side plate, distance between body side plates can be made comparatively small, and small image formation equipment can be offered.

[0066] Since according to invention concerning claim 4 special energization members, such as a spring, are not prepared in order to close a shutter, the image formation equipment which has a simple and cheap shutter breaker style can be offered.

[0067] Since according to invention concerning claim 5 the projection was prepared in the side face of a process cartridge and the rotation range of a junction member is regulated, damage on image support is prevented and the image formation equipment which can open and close a positive shutter can be offered.

[0068] Since according to invention concerning claim 6 the level difference of a tip minor diameter is prepared in the fitting section of the revolving-shaft hole of a junction member, and the support shaft of a cartridge case, and it prevents that a junction member is attached conversely and positioning of the shaft orientations of a junction member is made easy, the good image formation equipment of attachment nature can be offered.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional image formation equipment, components mark became [many devices concerning closing motion of the shutter of a process cartridge] complicated, and it had become the evil of the miniaturization of the body of equipment, or low-pricing. [0009] For example, in the case of the image formation equipment of the above-mentioned official report, in order that a rod and a rack might move in the slide direction, it was difficult [it] for the migration length to become long, to secure the tooth space, and to miniaturize the body of equipment. Therefore, this invention makes it a technical problem to offer image formation equipment [that it is small and low price / as a simple thing] for the breaker style of the shutter formed in opening for an imprint of a process cartridge.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] When the sign which it was made in order that this invention might solve this technical problem, namely, was given to the accompanying drawing is written in addition in a parenthesis, this invention It has a process means (11, 12, 15) to act on image support (10) and image support (10) in a cartridge case (19). Opening for imprinting the toner image formed in image support (10) to a transfer paper (P) is formed in a cartridge case (19). In the image formation equipment which is equipped with the process cartridge (20) which has further the shutter (45) which can be opened and closed to opening, opens and closes body covering (2 3) of the body of equipment (1), and inserts [process cartridge / (20)] The drive gear which is equipped with the lever (49) which interlocks and moves to closing motion of body covering (3), and is rotated in one with a shutter (45) to a process cartridge (20) (47), Where it had the junction member (48) which the cam (48b) which engages with the idler gear (48a) which engages with a drive gear (47), and a lever (49) unified and the body of equipment (1) is equipped with a process cartridge (20) It is image formation equipment characterized by opening and closing a shutter (45) by migration of the lever (49) interlocked with closing motion of body covering (3).

[0011] It is desirable in that case to form the idler gear (48a) and cam (48b) of a junction member (48) in the shaft orientations of a junction member (48) in the shape of a stage.

[0012] Furthermore, when the both ends of the direction which is in agreement with the longitudinal direction of a process cartridge (20) are equipped with a body side plate, respectively and the body of equipment (1) is equipped with a process cartridge (20), it is desirable to form so that the engagement section of an idler gear (48a) and a drive gear (47) may be arranged on the outside of a body side plate (4).

[0013] Moreover, when disconnection of body covering (3) is interlocked with and a lever (49) and a cam (48b) stop engaging, it is desirable to form so that rotation of a shutter (45) may resist gravity and may begin.

[0014] Moreover, it is desirable to prepare the projection (50) which regulates the rotation range of a junction member (48) to a cartridge case (19).

[0015] Moreover, it is desirable to equip a cartridge case (19) with the support shaft (51) which fits into the revolving-shaft hole (48c) of a junction member (48), and to make a revolving-shaft hole (48c) and a support shaft (51) into the configuration which has the level difference of a tip minor diameter, respectively.

[0016]

[Embodiment of the Invention] A drawing explains the gestalt of implementation of this invention. Drawing 1 - 13 show the image formation equipment by this invention. Drawing 1 is the schematic diagram showing the configuration of the important section of the laser copying machine as image formation equipment. A developer 12, imprint equipment 13, delevaing equipment 14, cleaning equipment 15, etc. are arranged in order in the hand of cut shown by the arrow head A in drawing from the electrification equipment 11 of the shape of a roller arranged horizontally [the] around the photo conductor 10 of the shape of a drum as image support.

[0017] When taking a copy with this laser copying machine, a copy switch is pushed after a user sets a manuscript on a contact lens (un-illustrating) a well-known passage. A transfer paper P is conveyed by the form conveyance section (un-illustrating) towards between a photo conductor 10 and imprint equipment 13 at the same time the image information of the manuscript set with the optical reader (un-illustrating) will be read, if a copy switch is pushed (it is the direction of an arrow head of drawing 1).

[0018] On the other hand, in a photo conductor 10, with the rotation, a front face is uniformly charged with electrification equipment 11, and laser beam L emitted by the front face from equipment (un-illustrating) write-in [optical] corresponding to the image information of the manuscript mentioned above is irradiated. Of this, the electrostatic latent image corresponding to the image of a manuscript is formed on a photo conductor 10.

[0019] Furthermore, with rotation of a photo conductor 10, the electrostatic latent image formed on the photo conductor 10 arrives at the location of a developer 12, and is formed into a visible image by adhering to a toner there. And the toner image as this copy image formed into the visible image is imprinted on the transfer paper P which arrived at the location of imprint equipment 13 further, and was conveyed in that location as mentioned above.

[0020] The transfer paper P after the copy image was imprinted discharges with delevaing equipment 14, and is separated from the photo conductor 10 to which it was sticking electrostatic. And a transfer paper P is discharged by the discharge section (un-illustrating), after being conveyed in the location of an anchorage device (un-illustrating) and being fixed to the transfer picture on a transfer paper P there.

[0021] On the other hand, in the photo conductor 10 after imprinting a toner image with imprint equipment 13, after the residual toner which remained without the front face imprinting is dropped [it scratched it and] and cleaned by the cleaning blade 17 with which cleaning equipment 15 was equipped, electricity is discharged with an electric discharge lamp (un-illustrating), and surface potential is initialized.

[0022] Moreover, in the illustration laser copying machine, the developer 12 is constituted by the developer stowage 21 established in the lower part side, and the developer support section 22 prepared in the upper part side, as shown in drawing 1 . Furthermore, the developer stowage 21 mainly consists of a 1st churning member 23, a 2nd churning member 24, a toner concentration sensor (un-illustrating), etc.

[0023] And 2 component developer which consists of the toners and carriers in the developer stowage 21 is agitated by the 1st churning member 23 and the 2nd churning member 24, and is supplied to the developer support section 22. Moreover, the toner of 2 component developer and the mixing ratio of a carrier are magnetically detected by the toner concentration sensor.

[0024] Furthermore, as shown in drawing 2 , the opening 25 of the new toner and the opening 26 of the recycle toner open, and are established upward in the developer stowage 21 at one side of a longitudinal direction, respectively. And by the 1st churning member 23 and the 2nd churning member 24, the toner containing from those openings 25 and 26 is conveyed so that it may circulate in the direction of an arrow head in drawing.

[0025] Here, the new toner supplied from the opening 25 of the new toner is supplied from the toner supply section (un-illustrating) which consists of a toner bottle, a toner hopper, a toner supply motor, etc. Moreover, the recycle toner supplied, i.e., the residual toner collected with cleaning equipment 15, is supplied through a toner conveyance member etc. from the opening 26 of the recycle toner.

[0026] As shown in drawing 3 , specifically, the toner conveyance member 30 prepared in the cleaning equipment 15 which it has on a photo conductor 10 at the shaft orientations of a photo conductor 10 consists of a shank 31, the screw section 32, etc.

[0027] And the residual toner conveyed by end section 31a of a shank 31 by the toner conveyance member 30 falls from the fall way inlet port 33 established in the dark room section 19a bottom of a cartridge case 19, as shown in drawing 4 . Then, a residual toner slides down the fall way 35 and goes into the fall way outlet 37. The residual toner which fell from the fall way outlet 37 falls to the opening 26 of the recycle toner of the developer 12 mentioned above.

[0028] On the other hand, as shown in drawing 1 , the developer support section 22 mainly consists of a developing roller 28, a development doctor 29, etc. The developing roller 28 is arranged through the development aperture 27 in the photo conductor 10 and the location which counters. Moreover, the development doctor 29 prepares a developing roller 28 and few clearances, is arranged, and is controlling the amount of the developer conveyed in the location of a photo conductor 10 by this clearance.

[0029] Here, in an illustration laser copying machine, as shown in drawing 4 , the photo conductor 10 mentioned above, electrification equipment 11, a developer 12, cleaning equipment 15, etc. are contained in the cartridge case 19, and form the unified process cartridge 20.

[0030] And as shown in drawing 5 , the process cartridge 20 is attached between the body side plates countered and arranged forward and backward within the body 1 of equipment of a laser copying machine, and it can further insert [process cartridge] in the direction of an arrow head in drawing. By this, a process cartridge 20 will be exchanged for the new process cartridge 20 by the user, or will be maintained.

[0031] A series of activities concerning insertion and detachment of a process cartridge 20 are explained in detail below. As shown in drawing 5 , when removing a process cartridge 20 from the body 1 of equipment, the right covering 3 of a body is first opened in the direction of an arrow head in drawing. Here, the right covering 3 of a body is equipped with the imprint equipment 13 and the delevaing equipment 14 which are not illustrated,

closing motion of the right covering 3 of a body is interlocked with, and they are attached to the process cartridge 20 within the body 1 of equipment, or are removed.

[0032] Next, the body frame front cover 2 is opened in the direction of an arrow head in drawing following the right covering 3 of a body of the body 1 of equipment. Then, a process cartridge 20 will be pulled out in the direction of an arrow head in drawing. On the other hand, when equipping the body 1 of equipment with a process cartridge 20, an activity contrary to this will be done.

[0033] In addition, closing motion of the body frame front cover 2 or the right covering 3 of a body is performed timely, when poor conveyance (jam) of a transfer paper else [at the time of insertion and detachment of a process cartridge 20] occurs. Moreover, even if the above-mentioned sequence of closing motion of the body frame front cover 2 and the right covering 3 of a body is reverse, insertion and detachment of a process cartridge 20 are possible.

[0034] And opening is prepared in the part (it is the part which counters imprint equipment 13 and delevaing equipment 14.) equivalent to the imprint section of a cartridge case 19, and as mentioned above, as shown in drawing 4 , the shutter 45 which can be opened and closed is further formed in the process cartridge 20 to the opening.

[0035] This shutter 45 is for protecting the photo conductor 10 exposed from opening, when a process cartridge 20 is removed from the body 1 of equipment, as mentioned above. That is, at least, at the time of a copy, the shutter 45 is moving to the location which opens opening, and when removed from the body 1 of equipment, a shutter 45 moves opening to a wrap location.

[0036] So, in addition, it consists of image formation equipment concerning this invention as follows that the breaker style of this shutter 45 should be made a simple thing. Drawing 6 and 7 are the perspective views showing the important section of a cartridge case 19. A shutter 45 is supported in the supporting-point section 46 of the both ends of a cartridge case 19, and is rotatable focusing on the supporting-point section 46. That is, drawing 6 shows the condition that the shutter 45 of a process cartridge 20 closed, and drawing 7 is the perspective view showing the condition that the shutter 45 opened.

[0037] And it is formed in the single-sided edge (it is the dark room section 19a side.) of a shutter 45 so that the drive gear 47 may rotate in one with a shutter 45. Here, the drive gear 47 may be formed in a shutter 45 and one by shaping, and may be formed in one of a screw, adhesion, etc.

[0038] Furthermore, wrap gear covering (un-illustrating) etc. is installed in the same side as this drive gear 47 in the junction member 48, the drive gear 47, and the junction member 48 equipped with idler gear 48a which engages with the drive gear 47.

[0039] The junction member 48 had revolving-shaft hole 48c in the interior, and has fitted into the support shaft 51 projected from dark room section 19a of a cartridge case 19. This junction member 48 is rotated centering on this support shaft 51. Moreover, idler gear 48a which engages with the drive gear 47 mentioned above in the junction member 48, and cam 48b which engages with the lever 49 mentioned later are prepared in shaft orientations in the shape of a stage. In this way, rotation of the junction member 48 is interlocked with and closing motion of a shutter 45 is carried out.

[0040] Next, closing motion of the shutter 45 of the process cartridge 20 interlocked with closing motion of the right covering 3 of a body of the body 1 of equipment in drawing 8 - drawing 13 is explained in detail. The junction member 48 in the body 1 of equipment etc. is interlocked with closing motion of the right covering 3 of a body in the edge by the side of dark room section 19a arranged, and it is formed in the right covering 3 of a body, and one as cam 48b of the junction member 48 and the movable lever 49 from which it engages and secedes show drawing 5 .

[0041] Here, as shown in drawing 13 , focusing on the rotation supporting point C of the right covering 3 of a body, a lever 49 draws the radii configuration of a radius r, and moves. In addition, this lever 49 may be separately formed in the right covering 3 of a body.

[0042] If the right covering 3 of a body specifically moves in the direction closed from an open condition, as shown in drawing 8 , the lever 49 will also move focusing on the rotation supporting point C, and the tip of a lever 49 will engage with cam 48b of the junction member 48 soon. Furthermore, if migration of the right covering 3 of a body progresses, migration of a lever 49 also progresses, cam 48b will be pushed on a lever 49, and the junction member 48 will begin rotation. In connection with this, idler gear 48a also begins rotation, and a shutter 45 begins rotation focusing on the supporting-point section 46 by engagement of idler gear 48a and the drive gear 47 in the direction which opens opening.

[0043] And when the right covering 3 of a body is shut completely, as shown in drawing 9 , a shutter 45 opens opening completely. If the right covering 3 of a body moves in the direction opened from an electric shielding condition contrary to this, engagement of a lever 49 and cam 48b will be solved, and a shutter 45 will cover opening with gravity, such as a shutter 45.

[0044] As mentioned above, the mark of the component part concerning the breaker style of a shutter 45 can be lessened as compared with the conventional breaker style, and simple image formation equipment can be offered.

[0045] Next, the motion is explained while drawing 11 and 12 explain the configuration of the junction member 48. As shown in drawing 11 , the junction member 48 mainly consists of idler gear 48a, cam 48b, revolving-shaft hole 48c, etc. And idler gear 48a and cam 48b are formed in the shape of a stage to the shaft orientations of the junction member 48, as shown in this drawing.

[0046] On the other hand, the lever 49 mentioned above is arranged to the body of equipment 1 interior corresponding to the location of this cam 48b. Thus, since it becomes the physical relationship from which the successive range of a lever 49 and the successive range of idler gear 48a always shifted to shaft orientations by having prepared idler gear 48a and cam 48b in the shape of a stage, there is no constraint on a special design and it can prevent that a lever 49 and idler gear 48a interfere mutually. Thereby, the junction member 48 can be made comparatively small.

[0047] Moreover, at least, when the body 1 of equipment is equipped with a process cartridge 20, as shown in drawing 12 , the engagement section of idler gear 48a and the drive gear 47 is formed so that it may be arranged on the outside of the body propleuron 4 shown in drawing 5 of the body 1 of equipment. By taking such a configuration, distance between the body side plates before and behind the body 1 of equipment can be made comparatively narrow.

[0048] That is, as mentioned above, since a process cartridge 20 is attached between the body side plates before and behind the body 1 of equipment, the distance between body side plates becomes larger than the distance between Itabe of the both ends of a cartridge case 19. And in order to store the right covering 3 of a body equipped with imprint equipment 13 etc. in the range of the width of face between body side plates, cam 48b related right covering of body 3 configuration and directly is arranged inside idler gear 48a which is not related right covering of body 3 configuration, and directly. And about idler gear 48a without the need of storing between body side plates, it arranges on the outside, and is made to engage with the drive gear 47.

[0049] Next, drawing 9 and 10 explain the gestalt of other operations. If the right covering 3 of a body is wide opened in order to remove a process cartridge 20 from the body 1 of equipment as mentioned above, a lever 49 will move in the direction (it is the direction of an arrow head in drawing.) which separates from cam 48b from the condition of drawing 9 . Here, the weight of cam 48b of the junction member 48 is set up comparatively greatly, and the shutter 45 is further set as bigger weight than the weight of cam 48b.

[0050] And if a lever 49 is canceled of cam 48b, it will move without auxiliary energization force, such as a spring, by the equilibrium of the moment of force of the gravity direction in the supporting-point section 46 of a related member until a shutter 45 closes this shutter breaker style completely.

[0051] Just before a lever 49 separates from cam 48b, specifically, rotation of the junction member 48 and a shutter 45 is inhibited [*****] by the lever 49. And immediately after a lever 49 separates from cam 48b, the junction member 48 and a shutter 45 begin to rotate with a shutter 45 or the weight of cam 48b. Namely, since it is designed so that the center of gravity of a shutter 45 may become the location slightly shifted in the direction closed from the line top of the perpendicularly the supporting-point section 46 is contained, or there at the time, the moment is committed in the direction which closes zero or a shutter 45 mostly.

[0052] Then, the center of gravity of a shutter 45 shifts greatly from on the vertical line containing the supporting-point section 46, the moment by the weight is added, and as shown in drawing 10 , rotation of the junction member 48 and a shutter 45 progresses. Further after that, it rotates further in the direction which closes opening, and, finally a shutter 45 moves a shutter 45 to the condition closed completely.

[0053] Thus, a certain and simple shutter breaker style can be offered, without preparing special energization members, such as a spring, in a shutter 45.

[0054] Next, drawing 8 and 9 explain the gestalt of other operations. In the cartridge case 19 of a process cartridge 20, the projection 50 (rib) which regulates the rotation range of the junction member 48 is formed in the dark room section 19a side in which the junction member 48 is formed.

[0055] As shown in drawing 8 , when a shutter 45 specifically closes, idler gear 48a of the junction member 48

contacts projection 50, and rotation of a shutter 45 progresses from a predetermined electric shielding location. By this, a shutter 45 rotates too much and the fault which damages a photo conductor 10 can be prevented.

[0056] Moreover, as shown in drawing 9, when a shutter 45 opens, cam 48b of the junction member 48 contacts projection 50, and rotation of a shutter 45 progresses from a predetermined open position. By this, as mentioned above, gravity can be resisted and rotation of a shutter 45 can be started certainly.

[0057] Here, if it attaches so that idler gear 48a and the projection 50 which mentioned above may contact, where a shutter 45 is closed completely in case the junction member 48 is attached to a cartridge case 19, a shutter 45 will be opened and closed in the always normal rotation range.

[0058] Next, drawing 11 and 12 explain the gestalt of other operations. The support shaft 51 of dark room section 19a which supports the junction member 48 serves as an axial configuration with the level difference of the tip minor diameter which has different shaft diameters d1 and d2, as shown in drawing 11. And revolving-shaft hole 48c of the junction member 48 which fits into this support shaft 51 is also a hole configuration with the level difference of the tip minor diameter which has the slightly larger diameters D1 and D2 of an axial hole than shaft diameters d1 and d2, as shown in the sectional view of the shaft orientations of the junction member 48 of drawing 12.

[0059] By this, the junction member 48 will always be set in the direction of normal, without setting conversely the direction of idler gear 48a and cam 48b to the support shaft 51. Moreover, positioning of the shaft orientations of the junction member 48 can be performed with the level difference configuration of this tip minor diameter. The attachment nature of a process cartridge 20 can be improved by such configuration.

[0060] In addition, in the example of illustration, although shutter breaker styles, such as the junction member 48 and a lever 49, were prepared in the body propleuron 4 side, this invention may be prepared in the opposite backside [a body], without being limited to this.

[0061] Moreover, in the example of illustration, although the insertion-and-detachment direction of a process cartridge 20 was made into the longitudinal direction of a photo conductor 10, even if it inserts in the direction which intersects perpendicularly with it, this invention is applicable. For example, the right covering 3 of a body of drawing 5 is opened and closed, and this invention is applicable even if it is image formation equipment of a configuration of inserting [process cartridge / 20] from there.

[0062] Moreover, in the example of illustration, although the laser copying machine was described as image formation equipment, naturally this invention is applicable to other image formation equipments, for example, an analog copying machine, facsimile, a laser beam printer, etc.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the schematic diagram showing the important section of the laser copying machine by this invention.

[Drawing 2] It is the perspective view showing the developer stowage of the developer of the process cartridge of the laser copying machine.

[Drawing 3] It is the perspective view which saw the interior of the process cartridge from the upper part.

[Drawing 4] It is the perspective view showing the process cartridge of the laser copying machine of this invention.

[Drawing 5] It is the perspective view showing the condition of inserting [process cartridge] from the body of laser copying machine equipment.

[Drawing 6] It is the perspective view showing the condition that the shutter of the process cartridge closed.

[Drawing 7] It is the perspective view showing the condition that the shutter of the process cartridge opened.

[Drawing 8] It is the schematic diagram showing the condition that the shutter of the process cartridge was closed.

[Drawing 9] It is the schematic diagram showing the condition that the shutter of the process cartridge opened.

[Drawing 10] It is the schematic diagram showing the condition that the shutter of the process cartridge shifts to electric shielding from disconnection.

[Drawing 11] It is the perspective view showing the junction member and support shaft of the process cartridge.

[Drawing 12] It is the sectional view showing the location of the junction member of the process cartridge, and a body propleuron.

[Drawing 13] It is the schematic diagram showing the locus of migration of the lever within the body of equipment.

[Description of Notations]

1 Body of Equipment

2 Body Frame Front Cover

3 Right Covering of Body

4 Body Propleuron

10 Photo Conductor (Image Support)

11 Electrification Equipment

12 Developer

13 Imprint Equipment

14 Deleaving Equipment

15 Cleaning Equipment

17 Cleaning Blade

19 Cartridge Case

19a Dark room section

20 Process Cartridge

21 Developer Stowage

22 Developer Support Section

23 1st Churning Member

24 2nd Churning Member

25 Opening of the New Toner
26 Opening of the Recycle Toner
27 Development Aperture
28 Developing Roller
29 Development Doctor
30 Toner Conveyance Section
31 Shank
31a End section
32 Screw Section
33 Fall Way Inlet Port
35 Fall Way
37 Fall Way Outlet
45 Shutter
46 Supporting-Point Section
47 Drive Gear
48 Junction Member
48a Idler gear
48b Cam
48c Revolving-shaft hole
49 Lever
50 Projection (Rib)
51 Support Shaft
P Transfer paper
L Laser beam

[Translation done.]

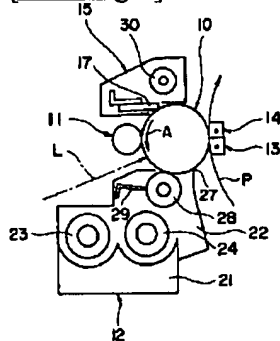
* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

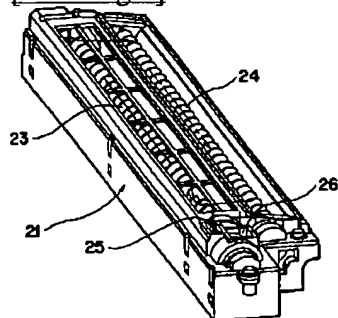
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DRAWINGS

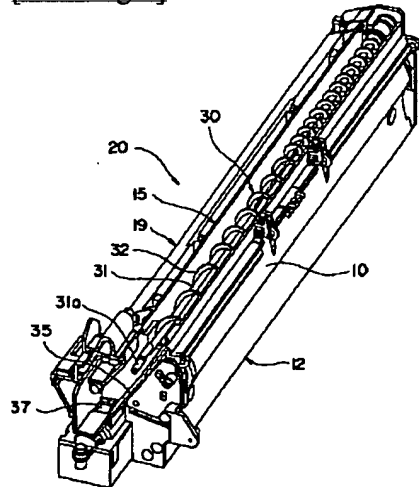
[Drawing 1]



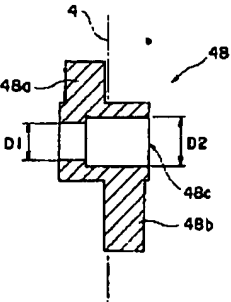
[Drawing 2]



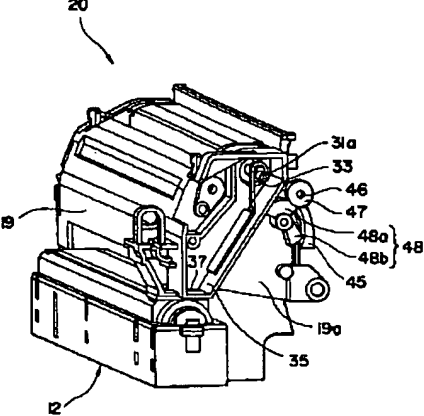
[Drawing 3]



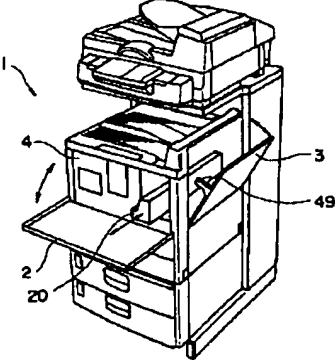
[Drawing 12]



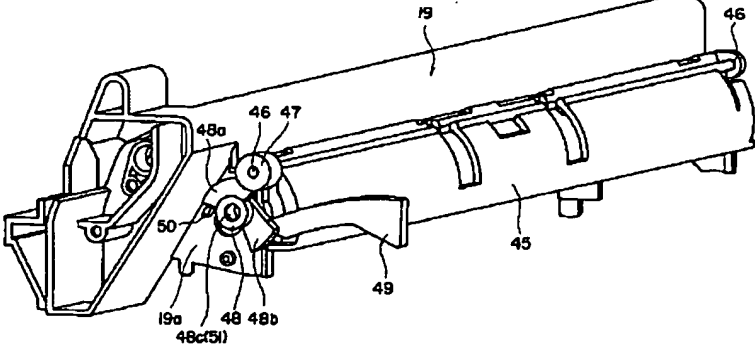
[Drawing 4]



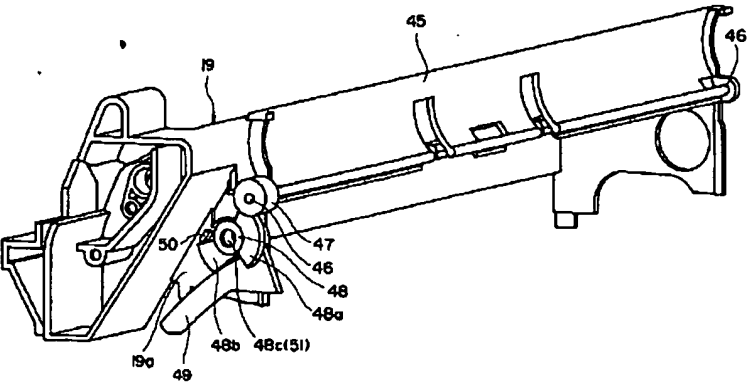
[Drawing 5]



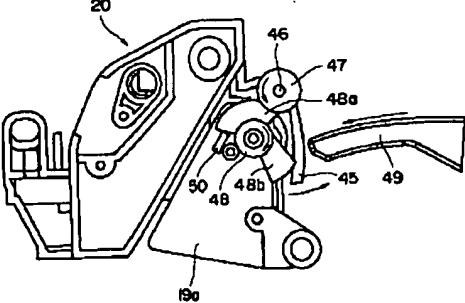
[Drawing 6]



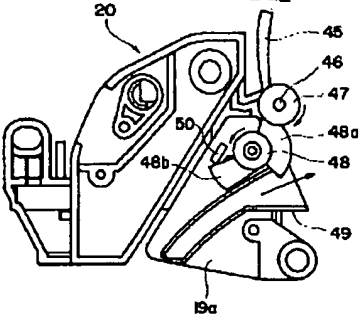
[Drawing 7]



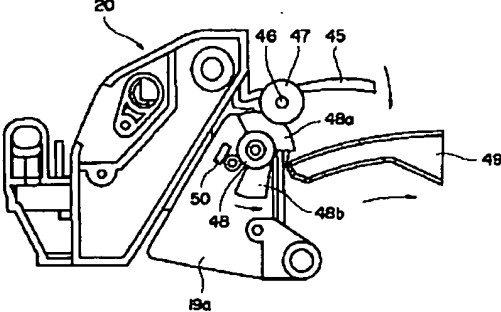
[Drawing 8]



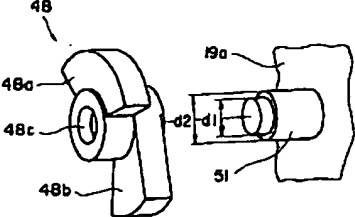
[Drawing 9]



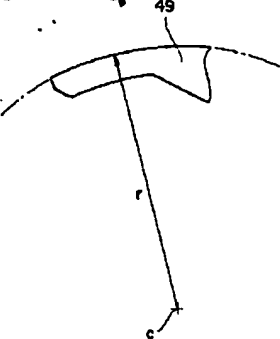
[Drawing 10]



[Drawing 11]



[Drawing 13]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-259061

(P2000-259061A)

(43) 公開日 平成12年9月22日 (2000.9.22)

(51) Int.Cl.⁷

G 0 3 G 21/18

識別記号

F I

C 0 3 G 15/00

データベース*(参考)

5 5 6 2 H 0 7 1

審査請求 未請求 請求項の数 6 O L (全 9 頁)

(21) 出願番号 特願平11-62844

(22) 出願日 平成11年3月10日 (1999.3.10)

(71) 出願人 000006747

株式会社リコー

東京都大田区中馬込 1 丁目 3 番 6 号

(72) 発明者 雨宮 賢

東京都大田区中馬込 1 丁目 3 番 6 号 株式
会社リコー内

(72) 発明者 水石 治司

東京都大田区中馬込 1 丁目 3 番 6 号 株式
会社リコー内

(74) 代理人 100074310

弁理士 中尾 俊介

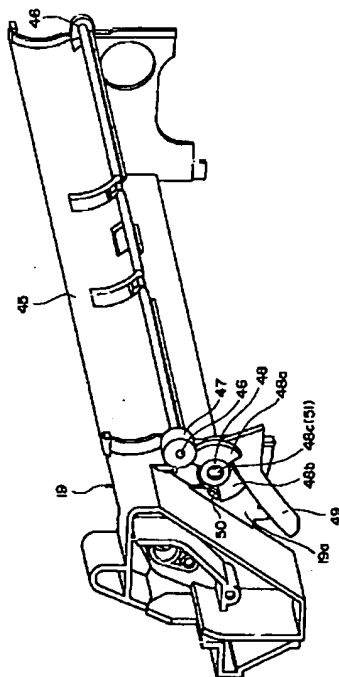
最終頁に続く

(54) 【発明の名称】 画像形成装置

(57) 【要約】

【課題】 プロセスカートリッジの転写用開口部に設けられたシャッタの開閉機構を簡素なものとして、小型で低価格な画像形成装置を提供する。

【解決手段】 本体カバー3の開閉に連動して移動するレバー49を備え、プロセスカートリッジ20に、シャッタ45と一体的に回転する駆動ギヤ47と、駆動ギヤ47に係合するアイドルギヤ48aとレバー49に係合するカム48bとが一体化した中継部材48とを備え、プロセスカートリッジ20を装置本体1に装着した状態で、本体カバー3の開閉に連動したレバー49の移動によって、シャッタ45の開閉を行う。



【特許請求の範囲】

【請求項1】 像担持体と該像担持体に作用するプロセス手段とをカートリッジケース内に有し、該カートリッジケースには前記像担持体に形成されたトナー像を転写紙に転写するための開口部が形成され、該開口部に対して開閉可能なシャッタをさらに有するプロセスカートリッジを備え、
 該プロセスカートリッジを、装置本体の本体カバーを開閉して挿脱する画像形成装置において、
 前記本体カバーの開閉に連動して移動するレバーを備え、
 前記プロセスカートリッジに、前記シャッタと一体的に回転する駆動ギヤと、該駆動ギヤに係合するアイドラギヤと前記レバーに係合するカムとが一体化した中継部材とを備え、
 前記プロセスカートリッジを前記装置本体に装着した状態で、前記本体カバーの開閉に連動した前記レバーの移動によって、前記シャッタの開閉を行うことを特徴とする画像形成装置。

【請求項2】 前記中継部材のアイドラギヤとカムとを、前記中継部材の軸方向に段状に形成したことを特徴とする請求項1に記載の画像形成装置。

【請求項3】 前記プロセスカートリッジの長手方向と一致する方向の両端にそれぞれ本体側板を備え、
 前記プロセスカートリッジを前記装置本体に装着したときに、前記アイドラギヤと駆動ギヤの係合部が前記本体側板の外側に配置されるように形成したことを特徴とする請求項1、または2に記載の画像形成装置。

【請求項4】 前記本体カバーの開放に連動して前記レバーとカムとが係合しなくなったときに、前記シャッタの回転が重力に抗して開始するように形成したことを特徴とする請求項1～3のいずれか1項に記載の画像形成装置。

【請求項5】 前記カートリッジケースに、前記中継部材の回転範囲を規制する突起を設けたことを特徴とする請求項1～4のいずれか1項に記載の画像形成装置。

【請求項6】 前記カートリッジケースに、前記中継部材の回転軸穴に嵌合する支持軸を備え、
 前記回転軸穴と支持軸とを、それぞれ先端小径の段差を有する形状としたことを特徴とする請求項1～5のいずれか1項に記載の画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、画像形成装置に関し、特に複写機、プリンタ、ファクシミリ、またはそれらの複合機などの電子写真方式を用いた画像形成装置に関する。

【0002】

【従来の技術】従来より、複写機やプリンタなどの画像形成装置では、感光体（像担持体）と、現像装置や帯電

装置などのプロセス手段とをカートリッジケース内に収納したプロセスカートリッジが用いられている。このプロセスカートリッジは、画像形成装置本体に対して挿脱可能に形成されており、サービス性やメンテナンス性の向上を図ることができると共に、装置全体の小型化を図ることができる。

【0003】さらに、プロセスカートリッジは、一般に、カートリッジケースにおける感光体の転写部に相当する部分に開口部を設けており、その部分から転写紙に感光体上のトナー像を転写している。しかし、画像形成装置本体から取り外されたプロセスカートリッジは、そのままでは、その開口部から感光体の一部が露出するため、その部分が外光により劣化したり、何らかの外力によって損傷したりする場合がある。

【0004】このような不具合を防止するために、感光体の転写部に相当する開口部に、開閉自在なシャッタを設けた画像形成装置が多く開発されている。すなわち、このような画像形成装置では、プロセスカートリッジを装置本体に装着して、実際にコピーなどの画像形成をするときには、シャッタが開いた状態になっている。それに対して、プロセスカートリッジを装置本体から取り出したときには、シャッタが閉じた状態にしている。

【0005】このようなシャッタ開閉機構を有する画像形成装置としては、例えば、特公平7-120136号公報において、以下のようなものが開示されている。この画像形成装置は、プロセスカートリッジの挿脱時に開閉する本体カバーに、シャッタを開閉させるためのロッドなどを備えている。そして、その本体カバーの開閉に連動して、シャッタが回転する構成となっている。

【0006】具体的には、プロセスカートリッジに、スプリングによって常に閉じる方向に付勢されたシャッタが設けられている。このシャッタの端部には、軸部が設けられている。他方、装置本体には、本体カバーの開閉に連動して移動するロッドと、そのロッドの移動に連動するラックと、そのラックと係合して回転するピニオン付きのシャッターレバーなどが設けられている。

【0007】このシャッターレバーは、装置本体に装着されたプロセスカートリッジのシャッタの軸部と係合するようになっている。そして、プロセスカートリッジが装置本体に装着された状態で、本体カバーを開閉すると、ロッドやラックがスライド方向に移動して、さらにそれに連動してシャッターレバーが、プロセスカートリッジのシャッタを開閉する。

【0008】

【発明が解決しようとする課題】上記従来の画像形成装置においては、プロセスカートリッジのシャッタの開閉に係る機構が、部品点数が多く複雑になってしまい、それが装置本体の小型化や低価格化の弊害となっていた。

【0009】たとえば、上記公報の画像形成装置の場合には、ロッドやラックがスライド方向に移動するため、

その移動距離が長くなり、そのスペースを確保して装置本体を小型化するのが難しかった。したがって、この発明は、プロセスカートリッジの転写用開口部に設けられたシャッタの開閉機構を簡素なものとして、小型で低価格な画像形成装置を提供することを課題とする。

【0010】

【課題を解決するための手段】この発明は、この課題を解決するためになされたものであり、すなわち、添付図面に付した符号をカッコ内に付記すると、この発明は、像担持体(10)と像担持体(10)に作用するプロセス手段(11、12、15)とをカートリッジケース(19)内に有し、カートリッジケース(19)には像担持体(10)に形成されたトナー像を転写紙(P)に転写するための開口部が形成され、開口部に対して開閉可能なシャッタ(45)をさらに有するプロセスカートリッジ(20)を備え、プロセスカートリッジ(20)を、装置本体(1)の本体カバー(2、3)を開閉して挿脱する画像形成装置において、本体カバー(3)の開閉に連動して移動するレバー(49)を備え、プロセスカートリッジ(20)に、シャッタ(45)と一体的に回動する駆動ギヤ(47)と、駆動ギヤ(47)に係合するアイドルギヤ(48a)とレバー(49)に係合するカム(48b)とが一体化した中継部材(48)とを備え、プロセスカートリッジ(20)を装置本体(1)に装着した状態で、本体カバー(3)の開閉に連動したレバー(49)の移動によって、シャッタ(45)の開閉を行うことを特徴とする画像形成装置である。

【0011】その際、中継部材(48)のアイドルギヤ(48a)とカム(48b)とを、中継部材(48)の軸方向に段状に形成することが好ましい。

【0012】さらに、プロセスカートリッジ(20)の長手方向と一致する方向の両端にそれぞれ本体側板を備え、プロセスカートリッジ(20)を装置本体(1)に装着したときに、アイドルギヤ(48a)と駆動ギヤ(47)の係合部が本体側板(4)の外側に配置されるように形成することが好ましい。

【0013】また、本体カバー(3)の開放に連動してレバー(49)とカム(48b)とが係合しなくなったときに、シャッタ(45)の回動が重力に抗して開始するように形成することが好ましい。

【0014】また、カートリッジケース(19)に、中継部材(48)の回動範囲を規制する突起(50)を設けることが好ましい。

【0015】また、カートリッジケース(19)に、中継部材(48)の回転軸穴(48c)に嵌合する支持軸(51)を備え、回転軸穴(48c)と支持軸(51)とを、それぞれ先端小径の段差を有する形状とすることが好ましい。

【0016】

【発明の実施の形態】この発明の実施の形態を図面によ

って説明する。図1～13は、この発明による画像形成装置を示す。図1は、画像形成装置としてのレーザ複写機の要部の構成を示す概略図である。像担持体としてのドラム状の感光体10の周囲には、その横に配置されたローラ状の帯電装置11から、図中の矢印Aで示す回転方向に順に、現像装置12、転写装置13、用紙分離装置14、クリーニング装置15などが配置されている。

【0017】このレーザ複写機にてコピーを取るときは、公知のとおり、ユーザーは、コンタクトレンズ(不図示)上に原稿をセットしてから、コピースイッチを押す。コピースイッチが押されると、光学読取装置(不図示)によってセットされた原稿の画像情報が読み取られると同時に、用紙搬送部(不図示)によって転写紙Pが感光体10と転写装置13との間に向けて搬送される(図1の矢印方向である。)

【0018】一方、感光体10においては、その回転にともない帯電装置11によって表面が一様に帯電されて、その表面には前述した原稿の画像情報に対応して光書込み装置(不図示)から発せられたレーザ光Lが照射される。これによって、感光体10上には、原稿の画像に対応した静電潜像が形成される。

【0019】さらに、感光体10の回転にともない、感光体10上に形成された静電潜像は、現像装置12の位置に達し、そこでトナーが付着されることによって可視像化される。そして、この可視像化されたコピー画像としてのトナー像は、さらに転写装置13の位置に達し、前述したようにその位置に搬送された転写紙P上に転写される。

【0020】コピー画像が転写された後の転写紙Pは、用紙分離装置14によって放電され、静電的に吸着していた感光体10から分離される。そして、転写紙Pは、定着装置(不図示)の位置に搬送され、そこで転写紙P上の転写画像は定着された後に、排出部(不図示)に排出される。

【0021】他方、転写装置13にてトナー画像を転写した後の感光体10では、その表面に転写されずに残った残留トナーが、クリーニング装置15に備えたクリーニングブレード17によって掻き落され清掃された後、除電ランプ(不図示)によって除電され表面電位が初期化される。

【0022】また、図示レーザ複写機において、現像装置12は、図1に示すように、下部側に設けられた現像剤収納部21と、上部側に設けられた現像剤担持部22とによって構成されている。さらに、現像剤収納部21は、主に第1攪拌部材23、第2攪拌部材24、トナー濃度センサ(不図示)などで構成されている。

【0023】そして、現像剤収納部21内のトナーとキャリアで構成される2成分現像剤は、第1攪拌部材23と第2攪拌部材24によって、攪拌されて現像剤担持部22に供給される。また、2成分現像剤のトナーとキャ

リアの混合比はトナー濃度センサによって、磁気的に検知される。

【0024】さらに、現像剤収納部21には、図2に示すように、長手方向の片側に、新規トナー補給口25とリサイクルトナー補給口26とがそれぞれ上向きに開けて設けられている。そして、それらの補給口25、26から入るトナーは、第1攪拌部材23および第2攪拌部材24によって、図中の矢印方向に循環するように搬送される。

【0025】ここで、新規トナー補給口25より供給される新規トナーは、トナーボトル、トナーホッパー、トナー補給モータなどで構成されるトナー補給部（不図示）から供給される。また、リサイクルトナー補給口26から供給されるリサイクルトナー、すなわち、クリーニング装置15で回収された残留トナーは、トナー搬送部材などを介して供給される。

【0026】具体的には、図3に示すように、感光体10の上に備えるクリーニング装置15内に、感光体10の軸方向に設けられたトナー搬送部材30は、軸部31やスクリュ部32などで構成されている。

【0027】そして、トナー搬送部材30によって軸部31の一端部31aに搬送された残留トナーは、図4に示すように、カートリッジケース19の前板部19aの上側に設けられた落下路入口33より落下する。その後、残留トナーは、落下路35を滑り落ちて、落下路出口37に入る。落下路出口37から落下した残留トナーは、前述した現像装置12のリサイクルトナー補給口26へ落下する。

【0028】一方、図1に示すように、現像剤担持部22は、主に現像ローラ28と現像ドクタ29などで構成されている。現像ローラ28は、現像窓27を通して感光体10と対向する位置に配置されている。また、現像ドクタ29は、現像ローラ28と僅かな隙間を設けて配置され、この隙間によって感光体10の位置に搬送される現像剤の量を制御している。

【0029】ここで、図示レーザー複写機において、前述した感光体10、帯電装置11、現像装置12、クリーニング装置15などは、図4に示すように、カートリッジケース19内に収納されており、一体化したプロセスカートリッジ20を形成している。

【0030】そして、プロセスカートリッジ20は、図5に示すように、レーザー複写機の装置本体1内で前後に対向して配置された本体側板間に取り付けられており、さらに図中の矢印方向に挿脱可能となっている。これにより、プロセスカートリッジ20は、ユーザーによって、新品のプロセスカートリッジ20に交換されたり、メンテナンスされることになる。

【0031】プロセスカートリッジ20の挿脱に係る一連の作業を、以下詳しく説明する。図5に示すように、プロセスカートリッジ20を、装置本体1から取り外す

ときには、まず、本体右カバー3を図中の矢印方向に開ける。ここで、本体右カバー3には図示せぬ転写装置13および用紙分離装置14が装着されており、本体右カバー3の開閉に連動して、それらが装置本体1内のプロセスカートリッジ20に対して取り付けられたり、取り外されたりする。

【0032】次に、装置本体1の本体右カバー3に続いて、本体前カバー2を図中の矢印方向に開ける。その後、プロセスカートリッジ20を、図中の矢印方向に引き出すことになる。これに対して、プロセスカートリッジ20を装置本体1に装着するときには、これと逆の作業をすることになる。

【0033】なお、本体前カバー2や本体右カバー3の開閉は、プロセスカートリッジ20の挿脱時の他に、転写紙の搬送不良（ジャム）が発生したときなどにも適時行われるものである。また、本体前カバー2と本体右カバー3の開閉の上記順番は逆であっても、プロセスカートリッジ20の挿脱は可能である。

【0034】そして、プロセスカートリッジ20には、前述したように、カートリッジケース19の転写部に相当する部分（転写装置13と用紙分離装置14に対向する部分である。）に開口部が設けられており、さらに、図4に示すように、その開口部に対して開閉可能なシャッタ45が設けられている。

【0035】このシャッタ45は、前述したように、プロセスカートリッジ20が装置本体1から取り外されたときに、開口部から露出した感光体10を保護するためのものである。すなわち、少なくともコピー時にはシャッタ45は開口部を開放する位置に移動しており、装置本体1から取り外されたときにはシャッタ45は開口部を覆う位置に移動する。

【0036】そこで、この発明に係る画像形成装置では、このシャッタ45の開閉機構を簡易なものにすべく、加えて次のように構成される。図6、7は、カートリッジケース19の要部を示す斜視図である。シャッタ45はカートリッジケース19の両端の支点部46で支持され、支点部46を中心に回転可能となっている。すなわち、図6は、プロセスカートリッジ20のシャッタ45が閉じた状態を示し、図7は、シャッタ45が開いた状態を示す斜視図である。

【0037】そして、シャッタ45の片側端部（前板部19a側である。）には、駆動ギヤ47がシャッタ45と一体的に回転するように形成されている。ここで、駆動ギヤ47は成形によりシャッタ45と一体に形成されても良いし、ネジや接着などにより一体に形成されても良い。

【0038】さらに、この駆動ギヤ47と同じ側には、駆動ギヤ47と係合するアイドルギヤ48aを備えた中継部材48や、駆動ギヤ47や中継部材48を覆うギヤカバー（不図示）などが設置されている。

【0039】中継部材48は、その内部に回転軸穴48cを有し、カートリッジケース19の前板部19aから突出した支持軸51に嵌合している。この中継部材48は、この支持軸51を中心に回転する。また、中継部材48には、前述した駆動ギヤ47と係合するアイドルギヤ48aと、後述するレバー49と係合するカム48bとが、軸方向に段状に設けられている。こうして、中継部材48の回転に連動してシャッタ45の開閉がされる。

【0040】次に、図8～図13にて、装置本体1の本体右カバー3の開閉に連動したプロセスカートリッジ20のシャッタ45の開閉について詳しく説明する。装置本体1における、中継部材48などの配置されている前板部19a側の端部には、本体右カバー3の開閉に連動して、中継部材48のカム48bと係合、離脱する移動可能なレバー49が図5に示すように本体右カバー3と一体に形成されている。

【0041】ここで、レバー49は、図13に示すように、本体右カバー3の回転支点Cを中心として、半径 r の円弧形状を描いて移動する。なお、このレバー49は、本体右カバー3とは、別個に形成されていても良い。

【0042】具体的には、本体右カバー3が開放状態から閉まる方向に移動していくと、図8に示すように、レバー49も回転支点Cを中心に移動していき、やがて、レバー49の先端が中継部材48のカム48bに係合する。さらに、本体右カバー3の移動が進むと、レバー49の移動も進み、カム48bはレバー49に押されて中継部材48が回転を始める。これに伴いアイドルギヤ48aも回転を始めて、アイドルギヤ48aと駆動ギヤ47の係合により、シャッタ45は支点部46を中心に、開口部を開く方向に回転を始める。

【0043】そして、本体右カバー3が完全に閉められたとき、図9に示すように、シャッタ45が開口部を完全に開放する。これとは逆に、本体右カバー3が遮蔽状態から開く方向に移動していくと、レバー49とカム48bの係合が解かれ、シャッタ45などの重力によって、シャッタ45は開口部を遮蔽する。

【0044】以上のように、シャッタ45の開閉機構に係る構成部品の点数を、従来の開閉機構と比較して少なくすることができ、簡素な画像形成装置を提供することができる。

【0045】次に、図11、12にて、中継部材48の構成を説明しながらその動きを説明する。図11に示すように、中継部材48は、主にアイドルギヤ48a、カム48b、回転軸穴48cなどで構成されている。そして、アイドルギヤ48aとカム48bは、同図に示すように、中継部材48の軸方向に対して、段状に形成されている。

【0046】一方、前述したレバー49は、このカム4

8bの位置に対応した装置本体1内部に配置されている。このように、アイドルギヤ48aとカム48bを段状に設けたことにより、レバー49の移動範囲とアイドルギヤ48aの移動範囲は、軸方向に対して常にずれた位置関係となるため、特別な設計上の制約なく、レバー49とアイドルギヤ48aとが互いに干渉することを防止することができる。これにより、中継部材48は比較的小型なものにすることができる。

【0047】また、プロセスカートリッジ20を装置本体1に装着したときに、図12に示すように、少なくとも、アイドルギヤ48aと駆動ギヤ47の係合部を、装置本体1の図5に示す本体前側板4の外側に配置されるように形成している。このような構成をとることにより、装置本体1の前後の本体側板間の距離を比較的小くすることができる。

【0048】すなわち、前述したように、プロセスカートリッジ20は、装置本体1の前後の本体側板間に取付けられるため、本体側板間の距離はカートリッジケース19の両端の板部間の距離より大きくなる。そして、転写装置13などを備えた本体右カバー3を、本体側板間の幅の範囲に収めるために、本体右カバー3形状と直接関連するカム48bが、本体右カバー3形状と直接関連しないアイドルギヤ48aの内側に配置される。そして、本体側板間に収める必要のないアイドルギヤ48aについてはその外側に配置し、駆動ギヤ47と係合させる。

【0049】次に、図9、10により、その他の実施の形態を説明する。前述したように、プロセスカートリッジ20を装置本体1から取り外すために本体右カバー3が開放されると、図9の状態から、レバー49がカム48bから離れる方向（図中の矢印方向である。）に移動する。ここで、中継部材48のカム48bの重量は比較的大きく設定されており、さらにシャッタ45はカム48bの重量より大きな重量に設定されている。

【0050】そして、このシャッタ開閉機構は、レバー49がカム48bから解除されると、関連する部材の支点部46における重力方向の力のモーメントの釣合いにより、スプリングなどの補助的な付勢力なしに、シャッタ45が完全に閉じるまで移動する。

【0051】具体的には、レバー49がカム48bから離れる直前までは、中継部材48とシャッタ45の回転は、レバー49によって抑止されている。そして、レバー49がカム48bから離れた直後に、シャッタ45やカム48bの重量によって、中継部材48およびシャッタ45が回転し始める。すなわち、シャッタ45の重心は、その時点では、支点部46を含む垂直方向の線上あるいはそこから閉じる方向に僅かにずれた位置になるように設計されているために、モーメントはほぼゼロあるいはシャッタ45を閉じる方向に働いている。

【0052】その後、シャッタ45の重心が支点部46

を含む垂直線上から大きくずれて、その重量によるモーメントが付加されていき、図10に示すように、中継部材48とシャッタ45の回転が進む。さらにその後、シャッタ45は開口部を閉じる方向にさらに回転して、最後にシャッタ45は完全に閉じた状態まで移動する。

【0053】このように、シャッタ45にスプリングなどの特別な付勢部材を設けることなく、確実に簡易なシャッタ開閉機構を提供することができる。

【0054】次に、図8、9により、その他の実施の形態を説明する。プロセスカートリッジ20のカートリッジケース19において、中継部材48が設けられている前板部19a側には、中継部材48の回転範囲を規制する突起50（リブ）が設けられている。

【0055】具体的には、図8に示すように、シャッタ45が閉じるときに、中継部材48のアイドラギヤ48aが突起50に当接して、所定の遮蔽位置からシャッタ45の回転が進まないようになっている。これによって、シャッタ45が回転しすぎて、感光体10を損傷する不具合を防止することができる。

【0056】また、図9に示すように、シャッタ45が開くときに、中継部材48のカム48bが突起50に当接して、所定の開放位置からシャッタ45の回転が進まないようになっている。これによって、前述したように、シャッタ45の回転を重力に抗して確実に開始することができる。

【0057】ここで、中継部材48をカートリッジケース19に組み付ける際に、シャッタ45を完全に閉じた状態で、アイドラギヤ48aと前述した突起50が当接するように組み付けられれば、シャッタ45は常に正常な回転範囲にて開閉することになる。

【0058】次に、図11、12により、その他の実施の形態を説明する。中継部材48を支持する前板部19aの支持軸51は、図11に示すように、異なる軸径d1、d2を有する先端小径の段差のある軸形状となっている。そして、この支持軸51に嵌合する中継部材48の回転軸穴48cも、図12の中継部材48の軸方向の断面図に示すように、軸径d1、d2より僅かに大きい軸穴径D1、D2を有する先端小径の段差のある穴形状となっている。

【0059】これにより、中継部材48は支持軸51に対して、アイドラギヤ48aとカム48bの方向が逆にセットされることなく、常に正規の方向でセットされることになる。また、この先端小径の段差形状により、中継部材48の軸方向の位置決めができる。このような構成により、プロセスカートリッジ20の組み付け性を向上することができる。

【0060】なお、図示例では、中継部材48やレバー49などのシャッタ開閉機構を、本体前側板4側に設けたが、この発明はこれに限定されることなく、反対の本体後側に設けても良い。

【0061】また、図示例では、プロセスカートリッジ20の挿脱方向を、感光体10の長手方向としたが、それと直交する方向に挿脱を行うものであっても、この発明は適用できる。たとえば、図5の本体右カバー3を開閉して、そこからプロセスカートリッジ20の挿脱を行う構成の画像形成装置であっても、この発明は適用できる。

【0062】また、図示例では、画像形成装置としてレーザー複写機について述べたが、この発明は、他の画像形成装置、たとえばアナログ複写機、ファクシミリ、レーザープリンタなどにも当然に適用できる。

【0063】

【発明の効果】請求項1に係る発明によれば、プロセスカートリッジの転写用開口部のシャッタの開閉を、装置本体のレバーと、プロセスカートリッジの中継部材と、そのシャッタ部の駆動ギヤとによって行うため、比較的部品点数が少なく、簡素かつ安価で、小型の画像形成装置を提供することができる。

【0064】請求項2に係る発明によれば、中継部材においてアイドラギヤとカムとを段状に形成しているため、レバーとアイドラギヤとの干渉を設計上の制約なく防止でき、中継部材が比較的小さい画像形成装置を提供することができる。

【0065】請求項3に係る発明によれば、アイドラギヤとシャッタの駆動ギヤの係合部を本体側板外に配置しているため、本体側板間の距離を比較的小さくでき、小型の画像形成装置を提供することができる。

【0066】請求項4に係る発明によれば、シャッタを閉じるために、スプリングなどの特別な付勢部材を設けることがないので、簡易かつ安価なシャッタ開閉機構を有する画像形成装置を提供できる。

【0067】請求項5に係る発明によれば、プロセスカートリッジの側面に突起を設けて、中継部材の回転範囲を規制しているので、像担持体の損傷を防止して、確実なシャッタの開閉が可能な画像形成装置を提供できる。

【0068】請求項6に係る発明によれば、中継部材の回転軸穴と、カートリッジケースの支持軸との嵌合部に、先端小径の段差を設けて、中継部材が逆に取り付けられることを防止し、かつ中継部材の軸方向の位置決めを容易としているので、組み付け性の良い画像形成装置を提供することができる。

【図面の簡単な説明】

【図1】この発明によるレーザー複写機の要部を示す概略図である。

【図2】そのレーザー複写機のプロセスカートリッジの現像装置の現像剤収納部を示す斜視図である。

【図3】そのプロセスカートリッジの内部を上方からみた斜視図である。

【図4】この発明のレーザー複写機のプロセスカートリッジを示す斜視図である。

【図5】そのレーザ複写機装置本体からプロセスカートリッジを挿脱する状態を示す斜視図である。

【図6】そのプロセスカートリッジのシャッタが閉じた状態を示す斜視図である。

【図7】そのプロセスカートリッジのシャッタが開いた状態を示す斜視図である。

【図8】そのプロセスカートリッジのシャッタが閉まった状態を示す概略図である。

【図9】そのプロセスカートリッジのシャッタが開いた状態を示す概略図である。

【図10】そのプロセスカートリッジのシャッタが開放から遮蔽へ移行する状態を示す概略図である。

【図11】そのプロセスカートリッジの中継部材と支持軸を示す斜視図である。

【図12】そのプロセスカートリッジの中継部材と本体前側板の位置を示す断面図である。

【図13】その装置本体内のレバーの移動の軌跡を示す概略図である。

【符号の説明】

- 1 装置本体
- 2 本体前カバー
- 3 本体右カバー
- 4 本体前側板
- 10 感光体（像担持体）
- 11 帯電装置
- 12 現像装置
- 13 転写装置
- 14 用紙分離装置
- 15 クリーニング装置
- 17 クリーニングブレード
- 19 カートリッジケース

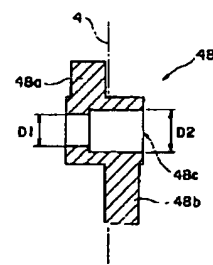
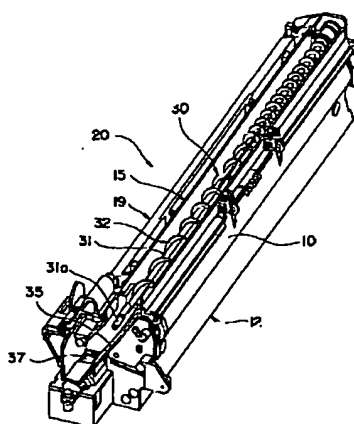
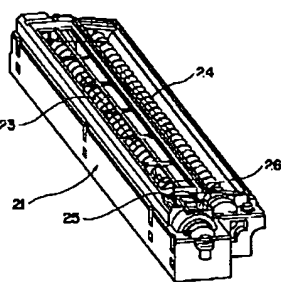
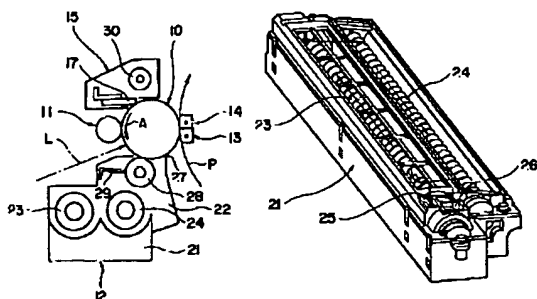
- 19a 前板部
- 20 プロセスカートリッジ
- 21 現像剤収納部
- 22 現像剤担持部
- 23 第1 攪拌部材
- 24 第2 攪拌部材
- 25 新規トナー補給口
- 26 リサイクルトナー補給口
- 27 現像窓
- 28 現像ローラ
- 29 現像ドクタ
- 30 トナー搬送部
- 31 軸部
- 31a 一端部
- 32 スクリュー部
- 33 落下路入口
- 35 落下路
- 37 落下路出口
- 45 シャッタ
- 46 支点部
- 47 駆動ギヤ
- 48 中継部材
- 48a アイドラギヤ
- 48b カム
- 48c 回転軸穴
- 49 レバー
- 50 突起（リブ）
- 51 支持軸
- P 転写紙
- L レーザ光

【図1】

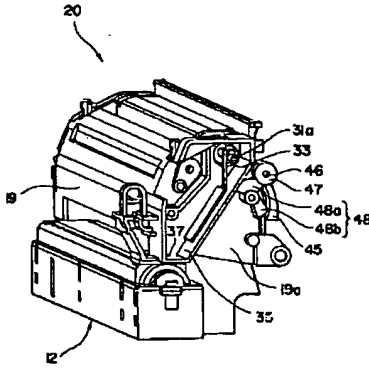
【図2】

【図3】

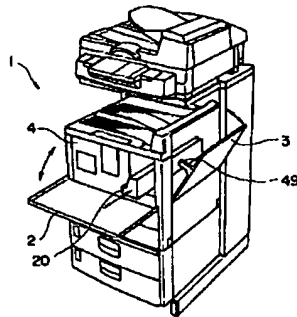
【図12】



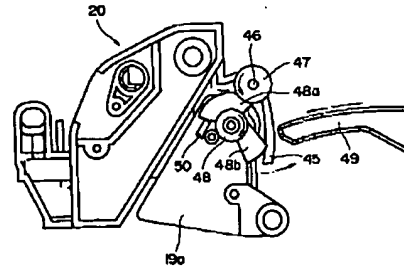
【図4】



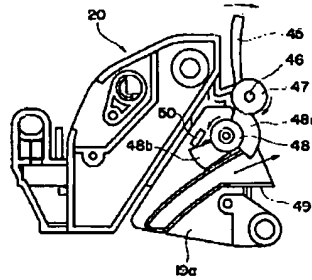
【図5】



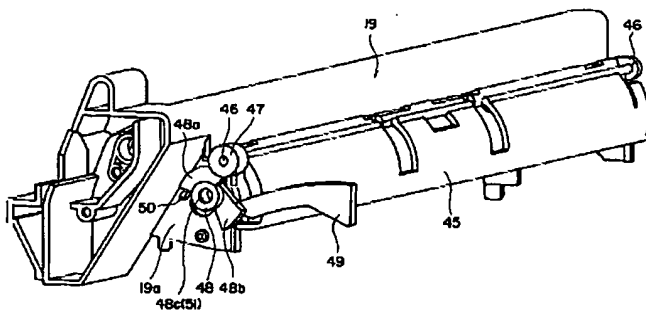
【図8】



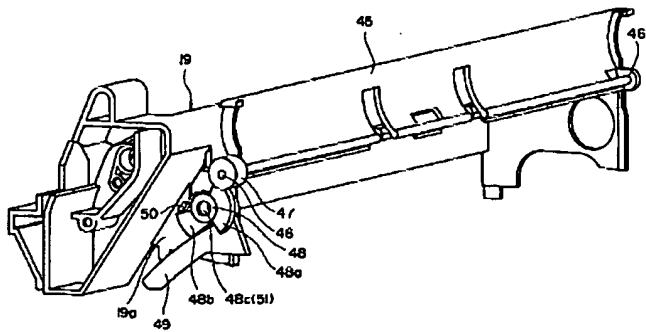
【図9】



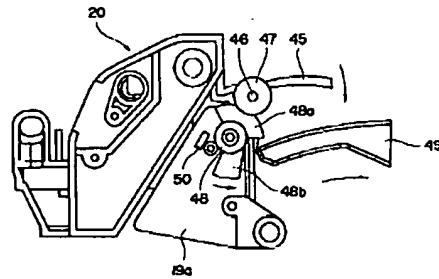
【図6】



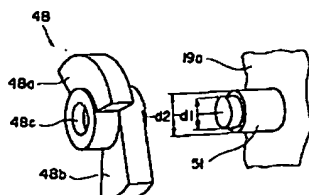
【図7】



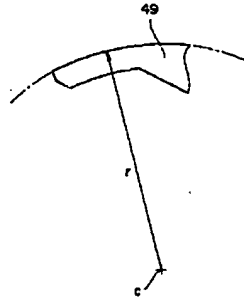
【図10】



【図11】



【図13】



フロントページの続き

(72)発明者 水沢 浩
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
(72)発明者 大堀 真由美
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
(72)発明者 田中 勝
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
(72)発明者 巽 謙三
東京都大田区中馬込1丁目3番6号 株式
会社リコー内

(72)発明者 碓井 則之
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
(72)発明者 山口 俊隆
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
(72)発明者 善波 英樹
東京都大田区中馬込1丁目3番6号 株式
会社リコー内
Fターム(参考) 2H071 BA04 BA13 BA23 DA06 DA08
DA15